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THE GERMINATION OF PACKETED VEGETABLE SEEDS.

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THE GERMINATION OF PACKETED VEGETABLE SEEDS.[1]

INTRODUCTION.

There is probably no subject relating to the cultivation of the soil in which so many persons are interested as in the home vegetable garden, since suburban and country residents generally depend on their gardens for a supply of vegetables throughout the major portion of the year. The garden is a place of interest to all the family, and here children with a small plat to call their own frequently get their first real acquaintance with plant life.

From both the educational and the practical standpoint it is important that the home garden should be planted with seeds which germinate well. The market gardener who uses large quantities of seeds can test them or have them tested for germination before planting and regulate the rate of seeding according to their vitality, but this is not practicable with the small packets used in planting the home garden. Most of the seeds used in planting such gardens are bought in packets either from local stores where box seeds are offered for sale, or they are ordered by mail after consulting the catalogue of a favorite seedsman.

Box seeds are put up in showy packets, lithographed in colors, and packed in boxes containing collections of all the common kinds and varieties of vegetables. These are sold outright to local stores or are sent to them to be sold on commission.

SEEDS TESTED FOR GERMINATION.

During the years 1907, 1908, 1909, and 1910 box seeds were purchased and tested for germination, and in 1911 seeds were bought from firms whose principal business is filling mail orders from catalogues. A summary of the results is shown in Table I.

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[1] During the past five years a series of tests has been carried on to determine the vitality of packeted vegetable seeds. Germination tests have been made of 18,571 packets, about one-third of them having been purchased from mail-order houses in 1911, and the other two-thirds bought at local stores where box seeds were sold, in 1907, 1908, 1909, and 1910. The germination of the mail-order and box seeds was 77.5 and 60.5 per cent, respectively. The seeds purchased from different mail-order houses were more nearly uniform in quality than the box seeds. The average germination of box seeds put up by one firm for four years was less than one-half that of those put up by another firm. The low vitality of many of the seeds tested is the best evidence that such seeds should be sold with a guaranty as to the percentage of germination.—B. T. GALLOWAY, *Chief of Bureau.*

TABLE I.—*General summary of germination tests of vegetable seeds made in 1907, 1908, 1909, 1910, and 1911.*

Tests by years.	Number of—			Average germination.	Germination 10 per cent and less.		Failed to germinate.	
	Different firms packeting.	Kinds of seed.	Packets.		Firms packeting.	Packets.	Firms packeting.	Packets.
Box seeds for 4 years:				*Per cent.*				
1907	27	19	2,567	63.5	12	106	8	42
1908	39	19	3,760	62.9	21	145	17	90
1909	33	19	2,863	59.1	18	158	17	119
1910	24	19	3,264	55.6	26	249	14	156
Total or average	60	19	12,454	60.5	....	658	....	407
Mail-order seeds in 1911	20	19	6,117	77.5	18	74	13	51

In these five years 18,571 packets of vegetable seeds were tested for germination. The box seeds were put up by 60 firms and the mail-order seeds were purchased from 20 firms. The average germination of all the packets of box seeds was 60.5 per cent, and the average germination of the mail-order seeds was 77.5 per cent. Of the 12,454 packets of box seeds, 658, or approximately 5 per cent, germinated 10 per cent or less, and 407, or approximately 3.5 per cent, failed to germinate. Of the 6,117 packets of mail-order seeds, 74, or approximately 1.2 per cent, germinated 10 per cent or less, and 51, or approximately 0.85 per cent, failed to germinate. While the vitality of much of this seed was low and in many instances the seed was worthless, under the present custom in the seed trade the purchaser has no information as to the quality of the seeds he is sowing, and when they fail to grow it is impossible to tell whether the failure is due to the use of poor seeds or to some unfavorable condition of soil or climate.

COMPARISON OF BOX AND MAIL-ORDER SEEDS, BY FIRMS.

Figure 1 shows the average germination, by firms, of the packets of box seeds put up by each of the 11 dealers whose seeds were purchased in four successive years, together with the average germination, by firms, of the mail-order seeds purchased in 1911. It will be noted that the average germination of the seeds from all but 3 of the mail-order houses was higher than the highest average for any of the 11 firms putting up box seeds.

GERMINATION OF BOX SEEDS, BY FIRMS.

Table II shows, by firms and years, the average germination of the box seeds purchased in each of the four years, together with the average germination for the whole period.

The difference in average germination for different firms is marked, the highest being 81.5 per cent and the lowest 36.5 per cent. Comparing the firms whose seeds were tested in each of four years, the highest is 73.7 per cent and the lowest is 36.5 per cent, the highest average being more than double the lowest average.

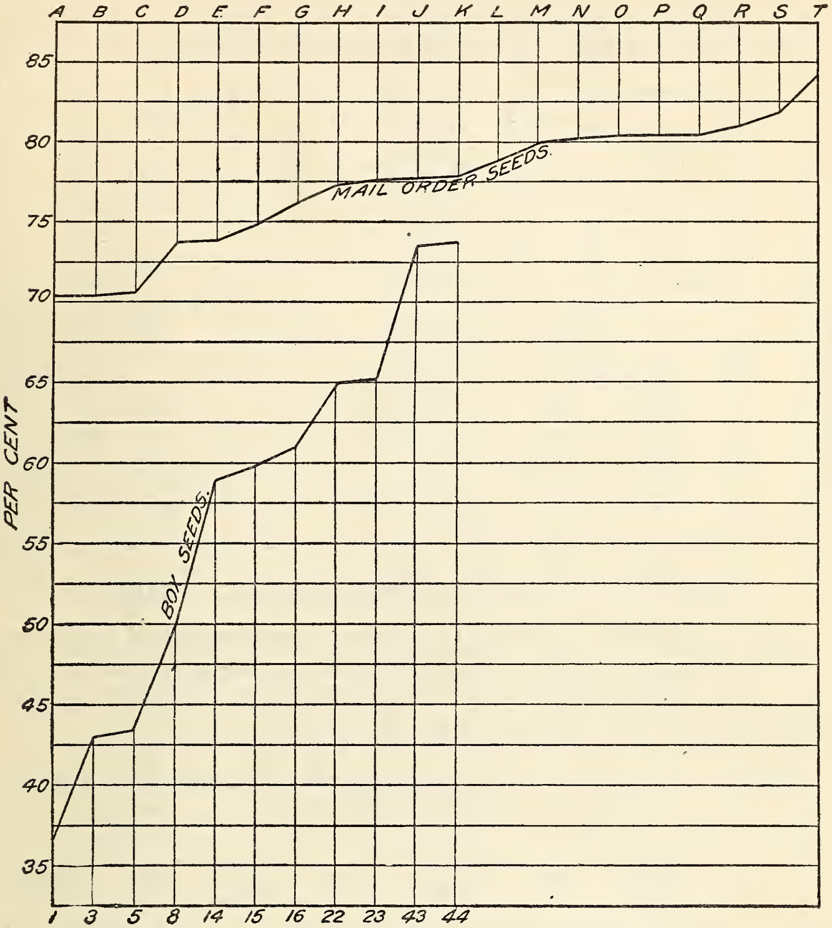

FIG. 1.—Curves showing average germination of box vegetable seeds put up by 11 firms in four successive years, and of mail-order seeds bought of 20 firms in one year. The letters at the top represent firms from whom mail-order seeds were purchased, and the figures at the bottom represent firms putting up box seeds.

TABLE II.—*Average germination of box vegetable seeds put up by 60 firms in four years.*

Firm No.	1907	1908	1909	1910	Average.	Firm No.	1907	1908	1909	1910	Average.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*		*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
1	39.5	37.1	37.0	30.4	36.5	33		69.8			69.8
2			25.1	51.7	41.4	34		81.9		66.1	69.9
3	41.9	43.6	40.8	42.1	42.8	35			70.6		70.6
4			43.0		43.0	36		70.9			70.9
5	51.4	42.2	49.1	35.8	43.4	37		71.1			71.1
6			45.8		45.8	38		62.8	82.0		71.8
7	48.6			44.2	46.3	39			73.1		73.1
8	53.8	52.2	48.3	44.8	49.8	40	74.0	77.1		62.6	73.2
9	57.9	49.2			51.6	41	72.8			73.4	73.2
10	56.9	49.6			52.6	42	74.4	70.7	74.9		73.3
11			53.1		53.1	43	76.6	80.2	88.1	58.8	73.5
12	80.6	14.0			54.6	44	75.3	74.6	72.2	72.7	73.7
13	46.7	68.8	60.2		58.4	45		73.8			73.8
14	59.6	61.8	56.8	54.2	58.9	46			77.8	69.8	74.2
15	57.8	66.6	46.9	60.3	59.8	47	74.5				74.5
16	60.5	61.6	64.8	57.2	61.2	48			74.9		74.9
17	66.1	47.1			61.5	49		75.4			75.4
18			61.6		61.6	50		75.7			75.7
19			63.2		63.2	51	73.5	76.1	79.4		75.8
20		64.2	76.1	59.6	63.8	52	77.7		74.6		76.3
21			64.4		64.4	53	76.8				76.8
22	68.5	62.7	66.6	61.1	64.8	54		77.1			77.1
23	65.7	75.9	69.4	62.2	65.2	55		80.5		74.6	77.3
24		65.6			65.6	56	79.1				79.1
25		66.2			66.2	57			79.5		79.5
26		66.6			66.6	58		81.3		79.0	79.6
27		67.2			67.2	59	82.6	74.2		78.5	79.9
28		63.4	67.5	70.9	67.4	60			81.5		81.5
29	70.9	68.2		64.3	68.5						
30			72.3	66.3	68.9	Average	63.5	62.9	59.1	55.6	60.5
31		69.1			69.1						
32			69.8		69.8						

GERMINATION OF MAIL-ORDER SEEDS, BY FIRMS.

Table III shows, by firms, the average germination of mail-order seeds purchased in 1911. The difference in average germination of seeds sent out by these firms is comparatively small, the highest being 81.8 per cent and the lowest 70.3 per cent.

TABLE III.—*Average germination of packeted vegetable seeds bought from 20 mail-order houses in 1911.*

Firm.	Average germination.	Firm.	Average germination.	Firm.	Average germination.	Firm.	Average germination.
	Per cent.		*Per cent.*		*Per cent.*		*Per cent.*
A	70.3	G	76.2	M	79.9	S	81.8
B	70.4	H	77.3	N	80.2	T	84.1
C	70.6	I	77.6	O	80.3		
D	73.7	J	77.7	P	80.4	General average	77.5
E	73.8	K	77.8	Q	80.4		
F	74.8	L	78.8	R	81.0		

COMPARISON OF BOX AND MAIL-ORDER SEEDS, BY KINDS.

Table IV shows, by kinds, the average germination of box seeds for each year, the average for the four years, and the average of the mail-order seeds for 1911. A comparison of the last two columns in this table shows the relative germination of the box and mail-order seeds, the average germination of box seeds for four years being lower for every kind than the average germination of mail-order seeds in 1911. The difference in germination between box and mail-order seeds of the same variety varies from 2.3 per cent for parsnip and 3.3 per cent for spinach to 28.5 per cent for cabbage and 29.5 per cent for onion.

TABLE IV.—*Average germination, by kinds, of vegetable seeds tested, 1907 to 1911.*

Kind of seed.	Box seeds.					Mail-order seeds.
	1907	1908	1909	1910	Average.	1911
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Bean	84.5	83.0	76.4	71.4	77.8	86.7
Lima bean	91.5	70.0	57.1	69.6	71.6	76.3
Cabbage	50.9	53.3	44.1	41.8	47.4	75.9
Carrot	46.1	44.4	46.7	42.7	44.9	55.0
Cauliflower	58.5	62.4	50.8	51.1	56.4	76.8
Sweet corn	72.6	64.9	59.6	62.4	64.8	83.1
Cucumber	69.3	69.3	66.5	55.5	65.7	76.7
Lettuce	76.7	75.3	75.0	72.7	74.9	87.9
Muskmelon	60.3	59.0	47.0	54.5	55.2	77.6
Onion	46.4	46.2	43.1	34.7	43.1	72.6
Parsnip	20.8	24.8	30.2	12.1	22.6	24.9
Garden pea	75.4	63.4	74.6	47.3	60.1	79.6
Pumpkin	65.1	62.3	58.6	59.3	61.2	73.4
Radish	70.8	76.1	67.7	72.7	72.0	79.9
Spinach	62.5	62.2	51.4	52.1	57.5	60.8
Squash	60.0	51.6	54.5	44.5	52.3	64.8
Tomato	68.9	66.9	66.5	65.0	66.8	79.4
Turnip	69.8	73.5	67.1	58.0	67.3	75.2
Watermelon	63.6	62.0	58.7	57.7	60.5	74.4
Average	63.5	62.9	59.1	55.6	60.5	77.5

BOX SEEDS OF HIGH AND LOW VITALITY.

Figure 2 shows by kinds the average germination for four years of box seeds put up by the two firms whose seed was most commonly found for sale. The average germination of the seeds put up by one of these firms was 73.7 per cent, while the average germination for the other firm was 42.8 per cent, a difference of 30.9 per cent. The average germination of the seeds put out by each of them was nearly uniform from year to year, the greatest difference between any two years for one firm being 3.1 per cent and for the other 2.8 per cent. While the quality of the seeds sold by the two firms is so different, each has its own standard of vitality and adheres to it closely.

VARIATION IN GERMINATION OF LETTUCE SEED.

Table V gives a comparison of the highest and lowest percentages of germination of lettuce seeds packeted by several firms putting up box seeds. It shows a wide difference in the germination of packets of the same kind of seed put out by the same firm in a given year.

TABLE V.—*Comparison of the highest and lowest percentages of germination of box lettuce seed packeted by eight firms.*

Firm No.	Germination.											
	1907			1908			1909			1910		
	Highest.	Lowest.	Difference.	Highest.	Lowest.	Difference.	Highest.	Lowest.	Difference.	Highest.	Lowest.	Difference.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
1	89	0	89							57	16	41
3	95	5	90	99	1	98	98	0	98	98	0	98
5	99	2	97	99	0	99	99	0	99	98	0	98
8	99	0	99	100	11	89	100	0	100	99	0	99
13				100	20	80	100	2	98			
14	100	19	81	97	0	97	99	35	64	99	3	96
15	100	2	98	99	0	99	98	0	98	99	0	99
16	100	17	83	100	6	94						

Table VI shows the highest and lowest percentages of germination for mail-order lettuce seed purchased from 10 firms in 1911. It is evident that the same firm in a given year sells different lots of the same kind of seed, some lots being very high and others very low in vitality.

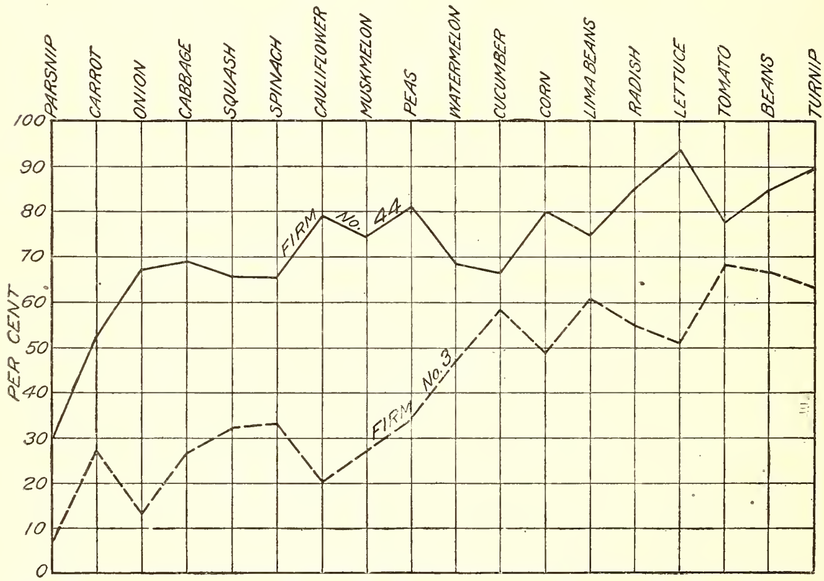

FIG. 2.—Curves showing average germination of box vegetable seeds by kinds in four years for two firms whose seeds were most commonly found for sale.

TABLE VI.—*Comparison of the highest and lowest percentages of germination of lettuce seed purchased from 10 mail-order houses.*

Firm.	Germination (per cent).			Firm.	Germination (per cent).		
	Highest.	Lowest.	Difference.		Highest.	Lowest.	Difference.
B	100	0	100	H	100	10	90
C	98	0	98	I	100	0	100
D	100	0	100	J	100	0	100
E	100	11	89	M	99	18	81
F	100	0	100	N	100	0	100

SEEDSMEN'S STATEMENTS SOMETIMES MISLEADING.

One firm in its catalogue makes a statement to the effect that, having carefully tested the seeds sold, it intends to sell only seeds of the best quality, but for self-protection against fraud on the part of purchasers all seeds are sold subject to the usual clause by which the dealer disclaims any warranty and all liability and responsibility for damage resulting from failure through the use of his seeds.

The average germination of the box seeds put up by this firm and tested for four years was 42.8 per cent, the highest average during that period being 43.6 per cent.

It would thus appear that such firms either do not test their seeds accurately or else disregard the results of such tests to the extent of including lots showing unsatisfactory germination in their output of packeted seeds for the box trade.

WHY MAIL-ORDER SEEDS GERMINATE BETTER THAN BOX SEEDS.

There is doubtless an economic reason for the higher average quality of the seeds sold by mail-order houses as compared with the seeds sent out by many of the houses selling box seeds. It is possible for a new firm or one without reputation to purchase a large quantity of seeds, put them up in showy packets and boxes, and by means of attractive prices dispose of them to local merchants either on commission or by sale outright. Mail-order houses, on the other hand, are dependent for their trade on proportionately few new customers each year, their business being based largely on the satisfactory quality of their seeds which purchasers have used in previous years.

GERMINATION OF SEEDS SHOULD BE GUARANTEED.

The sale of packeted vegetable seeds will not be on a proper basis until each packet is labeled with the percentage of live seed which it contains. This practice would do away with the trade in seeds of low vitality and at the same time give the purchaser the information to which he is entitled and without which he can not use to the best advantage the seeds he buys.

Approved:
JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., *July 5, 1912.*

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